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ABSTRACT

This paper presents an outline and a discussion of the philosophy and rationale for a course taught on Web design and production for teachers at the University of Nevada, Reno. Concepts illustrated on the demonstration page are listed, as are sites to which the main course page has links. Aids and cautions for instructors are provided. The problem of the changing nature of university computer courses and personnel in an age of Web-based teaching is introduced and discussed. A list of desirable components is given for Web pages used as supplements to traditional instruction. (Author/AEF)

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

A University Class in Web Design for Teachers: Content and Rationale

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Abstract: This paper presents an outline and a discussion of the philosophy and rationale for a course taught by the presenter on web design and production for teachers at the University of Nevada, Reno. Aids and cautions for instructors are provided. The problem of the needed changing nature of university computer centers and personnel in an age of web-based teaching will be introduced and discussed by the presenter and the audience.

Introduction

One of the most startling phenomena of this Century has been the rapid pace of development and proliferation of electronic technology. For those of us who enjoy observing technology and its effect on U.S. and world culture, this is surely the most interesting possible time to be alive. Indeed, in the last quarter of this Century, the pace of technological change has been so rapid, and we have become so accustomed to it, that we have almost ceased to notice each new development, which seems to proceed from innovation to cultural artifact in the space of a long breath.

The Rapid Pace of Technological Change

One of my students in a recent class mentioned that she had seen a list of innovations that we take for granted today, but that did not exist as recently as 1972. She mentioned *Magnetic Resonance Imaging*, *video cassette recorders*, *FAX machines*, and *bar codes*. To this list, the class added *pagers*, *CAT Scans*, *digital television*, *cellular telephones*, *the Global Positioning System*, *cordless telephones*, *laser surgery*, *automatic teller machines*, *compact disks*, *space stations*, *walkmen*, *digital cameras*, *surround sound*, and *large screen TVs*.

As remarkable as this list is, it would be incomplete without the addition of *personal computers*, the *Internet*, and the *World Wide Web*. In fact, computers and modern telecommunications probably hold more potential for transforming worldwide cultures than the rest of the innovations mentioned above put together.

Computers, Schools, and Cultural Momentum

At one time in the not-too-distant past, many of us feared that computing in education would not succeed, and that computers were in danger of being abandoned by teachers. That fear proved groundless, as computers became so firmly entrenched in every walk of life that I often think we could probably not now stop their continued entrance into schools even if we tried to do so. Computers have become ubiquitous. We see them everywhere we go, from the smallest to the largest businesses and governmental agencies, in libraries, restaurants, theatres, airports, and, increasingly, in schools. Computers have gained so much cultural momentum that they will continue to proliferate in schools and elsewhere.

Growth of the Internet and the World Wide Web

The growth of the Internet has been so rapid, and is so unprecedented that no one is really sure exactly how large it is at any given time, and estimates are out of date almost before they are published. Most estimates at the end of 1998 suggest that there are now at least 40 million Internet hosts, many of which

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represent hundreds or thousands of individual users. There are probably more than 80 million users in the United States alone, a figure that has grown by amost 30 million in the last nine months of the year. In fact, it appears that at least 11,000 new people go online each day. U.S. households with an Internet connection now number 20 million (42% of all households), and the fastest growth in achieving connectivity is among lower socioeconomic households. Projections are that by the year 2000, there will be at least 101 million hosts and the Internet will have grown by more than 2000% since its inception.

Figures on World Wide Web growth are even more impressive. Although the Web did not become available until 1993 when the Mosaic browser made its debut, the Web has grown to include at least 275 million pages and is increasing at a rate of about 20 million new pages per month. At least 1600 new businesses a day establish a web site and web sales have grown from $200 million in 1997 to at least $4 billion at the end of 1998.

The Internet, the Web, and the Transformation of Culture

With such amazing growth, it is obvious that the Internet and the Web is having, and will continue to have profound effects on worldwide culture. In the space of little more than five years, the ability to publish information has shifted from huge publishing houses, giant corporations, and governmental agencies to individual citizens anywhere in the world. If information is power (and I believe it is), this must represent *the most complete, rapid, and profound power shift in the history of the world!*

What the ultimate effect of this shift in the balance of power will be is anyone's guess. Already we see traditional publishing houses diversifying frantically and governmental agencies scrambling to regulate this new and, to many, frightening new medium. Even universities, which we like to regard as bastions of expressive freedom, are scrambling to regulate what students and faculty may and may not publish on the Internet and the Web. Indeed, the urge to *control* seems foremost in the minds of many of the traditional power brokers. It will be interesting to see if they are successful in curbing the individual's power to communicate with the new information tools. I suspect that any such successes will be localized, temporary, and trivial, as all such moves to curb the free and open exchange of information have been in the past. With regard to information and communication, history teaches us that *limits will be imposed only by the power of the technology, rather than by the power of government, regulation, and law.*

The Internet, the Web, and Teacher Education

It should not be surprising that the recent unprecedented growth of the World Wide Web has brought about a number of changes in universities. Among these changes has been:

1. the trend for professors to begin to use web pages as informational and/or instructional supplements to their courses, and
2. the trend for colleges of education to offer courses in web design for teachers.

A third development, and one which university administrators would do well to consider, is the rapidly growing trend for universities to offer traditional credit or even partial or complete university degrees for completion of coursework offered *totally* on the Web.

Although web-based courses and degrees have even more potential for transforming (some would say *destroying*) traditional university culture than do the other two trends, complete off-campus courses and degrees will not be discussed in this paper. The topic is deserving of a treatment all its own, and calls for an institutional, rather than a professorial response.

Suffice it to say at this time that I believe far too many universities, especially many of the venerable, research-based institutions in our country, seem to be "burying their heads in the sand" with regard to this issue. *Web based courses and degrees are not going to go away.* Indeed, they are continuing to grow spectacularly, and reacting to them by labeling them derisively as credit or degree mills will not prevent students from enrolling in them, any more than such labeling has prevented increasing numbers of students from availing themselves of other nontraditional, highly commercial, off-campus programs, many of which almost all of us agree are inferior.

Complete, web-based courses and degrees must be taken seriously by university administrators, and a reasoned institutional response formulated. Academic integrity should be a major consideration in all planning, but refusing to consider any alternative to traditional on-campus courses and programs may amount to administrative "fiddling while Rome burns."

Web Pages as Supplements to Traditional Instruction

Offering complete off-campus credit courses and programs are not within the authority of individual professors. However, most of us enjoy the freedom to institute web pages to supplement our traditionally offered classes. Such web supplements have many advantages. I have maintained such pages for all of my classes for the last two years, and have found the following components to be desirable:

1. Complete identification, including university, department, college, course name, course number, catalog description, abbreviation, semester and year, and name of instructor
2. One-paragraph statement of the purpose of the page.
3. Role of the course in the overall program.
4. Telephone number and office hours of the instructor and hot link to instructor's e-mail address
5. A "date last modified" line (I use a simple javascript program to keep this current automatically - details to come).
6. A "hit counter" to keep track of the number of times the page is viewed
7. Textbooks required and/or recommended
8. Course objectives in behavioral terms, when possible
9. Course requirements with full descriptions
10. Grading criteria
11. Links to recommended sites related to course content
12. Course calendar including due dates for all assignments and dates for all quizzes and tests
13. Links to my other web pages for other classes
14. Links to university page and to college and/or departmental pages
15. Credits for any graphics used on the page
16. Standard university footer including university name and logo, URL of the page, another "date last modified" line, and e-mail link to instructor.

As the semester goes by, I add links to each handout and a marquee or javascript alert at the top of the page for announcements. Examples of two such pages can be seen at:

1. *http://unr.edu/homepage/maddux/prog/sylcp411.html*
2. *http://unr.edu/homepage/maddux/stat/cep740/cep740s2.html*

The contents proposed above constitute a practical level at which to begin implementing web supplemental pages. Students indicate that they appreciate this service, and one of the great advantages is that it renders unnecessary most of the time-consuming searches of paper files to find handouts, syllabi, and other materials that students have lost or were absent when they were distributed. Since everything is on the web, instructors can simply advise such students to go to the class web page and download whatever is needed.

As time went by, however, and I discussed these class web pages with students, I realized that what many wanted represented a second level of complexity. Time and again, students expressed appreciation for the web pages, but emphasized that what they really needed were *lecture notes*, and *tutorials*. Consequently, I began adding them to the beginning and advanced statistics courses I teach. Two examples can be found at:

1. *http://unr.edu/homepage/maddux/stat/statpage.html#cep640*
2. *http://unr.edu/homepage/maddux/stat/cep741/cep741s1.html*

Although the addition of lecture notes and step-by-step tutorials have added considerably to the instructional workload for these courses, the initial investment of time and effort have proven well worthwhile in the long term. I no longer have to deal with students who were absent and who want a private repeat of the class.

More importantly, I have found student performance has increased considerably, since students can listen intently in class, then review the lecture notes at their leisure as many times as needed. Test scores have gone up dramatically. The addition of the tutorials have the same advantages. In addition to saving the cost of photocopies, students can watch as I do in-class demonstrations rather than scramble to take cumbersome and often inaccurate notes, then they can review the tutorials later, repeatedly if need be.

The major disadvantage of adding the lecture notes is the time it takes to convert them to HTML files. However, considerable speed can be developed at this over time. I usually return to my office and put up the day's lecture notes immediately after class, and it seldom takes me more than 45 minutes to do so for a class that meets for three hours once each week. Although I write the HTML directly, many instructors find an HTML editor such as *FrontPage 98* to be a better alternative. An unexpected advantage to converting my lecture notes for the Web is that it encourages me to write more complete and more up-to-date notes.

A Course in Web Design for Teachers

Many colleges of education with programs in information technology in education have begun to offer courses in web design for teachers. This is understandable in light of the current move to establish or increase Internet and Web connectivity in public schools. Naturally enough, such courses are especially appropriate for web page supplementary material.

One of the major decisions with such a course is whether to teach students to code directly in HTML (hypertext markup language) or whether to allow the use of a commercial HTML editor such as *MicroSoft's FrontPage 98*, or one of the many freeware or shareware programs that can be downloaded from the Web.

I believe that both approaches are necessary. Unfortunately, there is no such thing as a true *what-you-see-is-what-you-get* editor, and it is almost always necessary to "tweak" the code produced by any of the existing editors. To do so effectively and easily, one must master at least the rudiments of HTML. Then too, exclusive use of an editor ties students to PCs which have an installed editor, while the ability to write HTML can be practiced on any PC anywhere in the world, regardless of installed software.

Therefore, in our web design course, we begin with HTML, then slowly introduce editors and a variety of excellent web pages such as *TableMaker* (http://www.bagism.com/tablemaker/), *ColorMaker* (http://www.bagism.com/colormaker/), and *FrameShop* (http://www.bagism.com/frameshop/) which will produce customized HTML on the spot.

For this course, the concept of *lectures* make little sense. Therefore, I have put together a web page that demonstrates each of the concepts dealt with in the course. Each night, we cover several topics. The students can review these topics ahead of time or after class, and they can view the HTML source from the demonstration page as we go through it. The web page for the course is at: *http://unr.edu/homepage/maddux/prog/sylcp411.html*. There is a link to the demonstration page on the above page. The URL for the demonstration page is *http://unr.edu/homepage/maddux/prog/demohtml.html*. The demonstration page illustrates the concepts in the order specified below:

1. Formatting Text
2. Links
3. Meta Tags
4. More Text Formatting
5. Graphics
6. Alignment
7. Definitions and Lists
8. Using Color
9. Displaying Special Characters
10. HTML Tables
11. Controlling the Size of Tables
12. Tables and Color
13. HTML Validators and Checkers
14. Counters
15. Guestbooks
16. Free Submission Services
17. Free cgi-Scripting on Remote Servers
18. JavaScript
19. Forms
20. Image Maps

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One of the challenges in a course in which HTML plays a major role, is keeping a focus on educational design issues. Throughout the entire course, the emphasis should be on writing pages which are of educational benefit to students and teachers.

In keeping with this goal, there are links on the main course page to the following sites that I have found to be of benefit in keeping an instructional orientation. I have listed only those sites that have proven to be available over a long period time:

1. *Best High School Web Site - http://www.baseball-news.com/highschool/besthswebsites.htm*
2. *Best School Web Sites - http://www.rdg.ac.uk/~veskeinr/scwebsit.htm*
3. *Blue Web'n Site Evaluation Form - http://www.kn.pacbell.com/wired/bluewebn/rubric.html*
4. *Web Resources for Teachers - http://www.cableducation.ca/cic/connecting.html*
5. *Developing a School Home Page - http://www.siec.k12.in.us/~west/online/noncoll1.htm*
6. *Designing School Web Sites - http://fromnowon.org/webdesign.html*
7. *A Guide for K-12 Schools Wishing to Get on the Internet - http://www.cvu.cssd.k12.vt.us/k12tech/k12tech.htm*
8. *Guidelines and Suggestions for School Web Sites - http://www.madison.k12.wi.us/hpguides.htm*
9. *High School Web Sites - http://news.vpsa.asu.edu/search/hsnews.html*
10. *High School Web Sites: Tips - http://7-12educators.miningco.com/msub7.htm*
11. *Infoseek's School Web Sites - http://seek-p.infoseek.com/Topic/Kids_and_Family/Education/Internet/School_web_sites*
12. *Kathy Schrock's List of Links to Web Evaluation Instruments - http://www.capecod.net/schrockguide/eval.htm*
13. *K-12 School Webpage Policies and Guidelines - http://206.76.136.3/resources/webguid.html*
14. *NPDL: Evaluating Educational Web Sites - http://oii.org/archives/evaluate.html*
15. *Resources for Educational Website Development - http://www.ilt.columbia.edu/k12/livetext-nf/wwwdev.html*
16. *School Cyberlibraries - http://www.infotoday.com/MMSchools/nov97/voic1197.htm*
17. *School Web Page Development Guide - http://www.massnetworks.org/~nicoley/schools/*
18. *School Web Sites of the Year - http://www.vste.org/sigs/sigtel/website.html*
19. *Selected Elementary School Web Sites Featuring Student Work - http://www.microstore.com/ardis/schoolsites.html*
20. *Site Evaluation Form - http://www2.open.k12.or.us/jitt/evalform.html*
21. *Tracy Marks' Best K-12 Schools Bookmarks - http://www.geocities.com/~webwinds/k12/schools.htm*
22. *The Web as a Research Tool: Evaluation Techniques - http://www.science.widener.edu/~withers/evalout.htm*
23. *Web Style Resources: Best and Worst of the web - http://www.devry-phx.edu/webresrc/webmstry/stylbest.htm*
24. *WWW CyberGuide Ratings for Web Site Design - http://www.cyberbee.com/guide2.html*
25. *WWW Style - http://www.hypernews.org/HyperNews/get/www/style.html*
26. *What Makes a Good Webpage? - http://www.crpc.rice.edu/CRPC/Women/GirlTECH/Materials/rubric.html*

From Centralized Computing to Distributed Computing and Back Again

One of the major problems with making use of the Web for educational purposes of any kind is the loss of control over the teaching and learning resources experienced by individual instructors who embrace this new technology. The more instructors begin to rely on the Internet and Web in their instruction, the more catastrophic to teaching and learning it becomes when hardware or software problems make telecommunications unavailable.

It is ironic that the educational computing movement began with reliance on centralized computing for a host of schemes involving old-fashioned programmed instruction. As personal computers became available, we moved quickly away from centralized computing and toward distributed, desktop computing.

However, the Internet and the Web have changed all that. In universities and in public schools, instructors are relying more each day on centralized services to provide them with Internet connectivity and mainframe software such as statistical packages, mail readers, etc. *Unfortunately, most university and*

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school district system computing specialists are not ready for this return to a reliance on centralized computing.

What many IT specialists lack is not technical expertise, but the belief in the importance of, and skill in assisting non-technical specialists. They also need the realization that instructors who rely on central computing for connectivity while conducting a class, cannot be expected to defer requests for help days into the future. If a lesson requires students to use E-mail, instructors panic and reach out for immediate assistance when the mail server goes down just before class convenes, or when they discover that their students' E-mail accounts have been deactivated with no advance warning. There is no longer room in system computing for technicians who dislike dealing with people, who refuse to return telephone calls, or who make sweeping changes in widely-used hardware and software without notifying all instructors who depend on these services.

Because of such problems, many university departments have elected, out of desperation, to establish their own web servers and mail servers, and provide other specialized hardware and software at the departmental level. In many cases, this kind of duplication of hardware and software is not cost-effective or otherwise efficient, and is done only because the central computing system has proven unresponsive to the instructional needs of non-technical faculty and staff.

I believe unresponsiveness of computing system technical staff to the time sensitive instructional needs of faculty is one of the major roadblocks to wide web usage in courses in typical American universities. I am unsure how best to begin to address this problem. I am reluctant to propose additional meetings, but it does seem to me that instructors and IT professionals employed by central computing services need to talk more. Those hiring IT professionals need to make the ability to assist non-technical faculty an important requirement for employment, and such ability needs to be encouraged and rewarded among existing IT staff.

Conclusions

The Internet and the World Wide Web have only just begun to transform worldwide culture. Education typically lags behind the rest of culture in terms of the pace of change. However, the Internet and the Web are so pervasive, and have attained so much cultural momentum, that this technology has already begun to bring about profound changes in education. Cultural change is never altogether comfortable for everyone, and always causes a number of problems. With all its current problems, however, I believe that we are privileged to be alive and to be educators during such exciting times. I believe the Internet and the Web represent the first and only technology with the potential to revolutionize teaching and learning. Perhaps we will finally realize our long-standing and unrealized dream of individualization of instruction. And I believe we can and will solve most of the problems we are currently experiencing as we begin to bring the Internet into classrooms. Information technology in education has withstood the first wave of challenges, and computers are in classrooms to stay. What we do in the next few years will determine whether or not the new technologies are as beneficial to education as they promise to be in most other walks of life.